1. PROJECT DESCRIPTION

1.1 PROJECT BACKGROUND

The South Carolina State Ports Authority (SCSPA) has proposed the development of a marine cargo terminal at Daniel Island in Charleston, South Carolina. The proposed project includes: 1,300 acres of cargo and terminal facilities at the southern end of Daniel Island; 7,000-ft of wharf and berthing areas on the Cooper River; 5,000-ft of wharf and berthing areas on the Wando River; approximately 35 acres of dredged berthing area; Federal navigation channel improvements; and new roadway and rail construction. URS Greiner, under contract to SCSPA, was tasked to assist the U.S. Army Corps of Engineers (USACE) – Charleston District with the preparation of an Environmental Impact Statement (EIS) for the Daniel Island Marine Cargo Terminal project.

1.2 PROJECT PURPOSE

As part of the EIS process, EA Engineering, Science, and Technology, was requested to sample and conduct analytical and ecotoxicological testing of the sediment to be dredged. Sampling and analysis of the sediment to be dredged was required:

- to document existing physical, chemical, and toxicological characteristics of the sediment at the proposed site and alternative site;
- to identify potential chemical constituents of concern;
- and to determine if the sediment proposed for dredging could be placed at the Charleston Ocean Dredged Material Disposal Site (CODMDS).

This report presents a synopsis of the sampling program and results of bulk chemistry, ecotoxicological, and bioaccumulation studies for sediments from the project area and from a reference site in the vicinity of the CODMDS. The project schedule, key personnel, the Quality Assurance Project Plan, and the Accident Prevention Plan/Hazard Analysis for the project are documented in the Work Plan (EA 1998) that was submitted to, and approved by, the U.S. Army Corps of Engineers (USACE)–Charleston District and U.S. EPA Region IV in July 1998.

1.3 PROJECT OBJECTIVES

The objectives of this project were to:

- Collect sediments representative of the sampling locations (to a depth of -47 ft. mean low low water [MLLW] or to the Cooper marl, whichever was shallower).

- Test bulk sediments for metals, pesticides, polychlorinated biphenyls (PCBs), polynuclear aromatic hydrocarbons (PAHs), dioxins and furans, and for physical characteristics.

- Conduct water column bioassays, whole sediment bioassays, and bioaccumulation testing with project area and reference site sediments.

- Statistically compare sediment toxicity and bioaccumulation data from the project area to sediment toxicity and bioaccumulation data from the reference location.

- Submit a comprehensive report that provides a summary of field activities, results of analytical and ecotoxicological tests, statistical comparisons of toxicity and bioaccumulation data at the project sites and the reference site, and documentation of appropriate quality assurance/quality control (QA/QC) information.

1.4 DESCRIPTION OF THE PROJECT AREA

The project site is located near Daniel Island in the Port of Charleston, South Carolina. Daniel Island is located within Charleston County, South Carolina approximately 50 miles southwest of Georgetown, South Carolina and 65 miles northeast of Savannah, Georgia (Figure 1-1).

Sediment sampling was conducted at 14 locations on three reaches or bodies of water:

- Cooper River (6 locations)
- Wando River (5 locations)
- Atlantic Ocean (3 locations)

Sampling on the Cooper River consisted of sediment collection at three locations adjacent to the west shore of Daniel Island (proposed berthing areas) and at three locations adjacent to the Charleston Naval Base and Clouter Creek (proposed alternative site). Water depth in the region ranged from approximately 6 ft to 34 ft. Sampling locations in this area have not been dredged previously.

Sampling on the Wando River consisted of sediment collection at two locations adjacent to the east shore of Daniel Island (proposed berthing areas) and three locations the Wando River Lower Reach (proposed for realignment/widening). Water depth ranged from approximately 6 ft to 25 ft. Sampling locations in Wando Lower Reach have been dredged previously.

Sampling in the Atlantic Ocean near the CODMDS consisted of sediment collection at three reference stations. Water depth ranged from approximately 20 ft to 25 ft. Disposal of dredged material has previously occurred in this region for sediments complying with chemical guidelines in the *Green Book* (EPA 1991) and the *EPA Region IV Regional Implementation Manual (RIM)* (USACE and U.S. EPA 1993).

1.5 EXPERIMENTAL DESIGN

The analytical and ecotoxicological testing for the Daniel Island sediment study followed guidance provided in:

- U.S. EPA/USACE, 1991. *The Green Book.*
- USACE/U.S. EPA, 1993. *Regional Implementation Manual, Region IV.*
- U.S. EPA, 1995. *QA/QC Guidance for Sampling and Analysis of Sediments, Water, and Tissues for Dredged Material Evaluations*.
- URS Greiner, 1998. *Sediment Sampling and Analysis Plan (SSAP) for Dredging Associated with the Proposed Daniel Island Marine Cargo Terminal.*
- U.S. EPA/USACE, 1998. *Inland Testing Manual (ITM).*

The testing encompassed the following tasks:

- Bulk sediment analysis for metals, pesticides, PCBs, PAHs, dioxins/furans, fluoride, total organic carbon (TOC), tributyl tin, grain size, and total solids;
- 96-hour water column bioassays with *Mysidopsis bahia* (opossum shrimp) and *Menidia beryllina* (inland silverside) and 48-hour water column bioassays with *Arbacia punctulata* (purple sea urchin);
- 10-day whole sediment bioassays with *Leptocheirus plumulosus* (estuarine amphipod) and 96-hour whole sediment bioassays with *Mysidopsis bahia* (opossum shrimp);
- 28-day whole sediment bioaccumulation studies with *Neanthes virens* (sand worm) and *Macoma nasuta* (blunt-nose clam). Tissues were analyzed for lipids and for constituents of concern identified by the results of the bulk sediment analysis and calculation of Theoretical Bioaccumulation Potential (TBP).

1.6 REPORT ORGANIZATION

This report contains a comprehensive summary of field activities and results of bulk sediment testing, ecotoxicological testing, and bioaccumulation studies. The field sampling program for the project is described in Chapter 2. Methodology and results for the ecotoxicological testing, bulk sediment testing, and tissue analysis/bioaccumulation testing are provided in Chapters 3, 4, and 5, respectively. Chapter 6 provides a summary and discussion of results of the bulk sediment, ecotoxicological, and bioaccumulation studies. A list of cited references is provided in Chapter 7. Supplemental information for each chapter of the report, such as laboratory bench sheets, chain-of-custody documentation, and certificates of analysis, are included as attachments at the end of the report.